SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Shenzhen, Guangdong, China 518057
Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

TEST REPORT

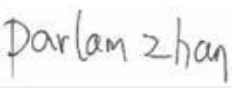
Application No.:	SZEM1801000172CR (SHEM1711007979CR)
Applicant:	Kohler Co.
Address of Applicant:	444 Highland Drive Kohler, WI 53044 United States
Manufacturer:	Shanghai Kohler Electronics., Ltd.
Address of Manufacturer:	No. 1955, Fengxiang Road, Baoshan Area, Shanghai, PRC Post code: 200444
Factory:	Shanghai Kohler Electronics., Ltd.
Address of Factory:	No. 1955, Fengxiang Road, Baoshan Area, Shanghai, PRC Post code: 200444
FCC ID:	N82-KOHLER025
IC:	4554A-KOHLER025
Equipment Under Test (EUT):	
EUT Name:	C3-455 Cleansing Toilet Seat
Model No.:	K-8298-CR
Trade mark:	KOHLER
Standard(s) :	47 CFR Part 15, Subpart C 15.249
	RSS-210 Issue 9 Annex B.10, RSS-Gen Issue 4
Date of Receipt:	2017-11-27
Date of Test:	2017-12-22 to 2017-12-27
Date of Issue:	2018-01-09
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny xu
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2018-01-09*		*Original*

Authorized for issue by:				
				
		Vincent zhu /Project Engineer		
				
		Parlam Zhan /Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.249; RSS-Gen Section 8.3	N/A	47 CFR Part 15, Subpart C 15.203; RSS-Gen Section 8.3	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.249; RSS-210 Issue 9 Annex B.10	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207; RSS-Gen Section 8.8	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C 15.249; RSS-210 Issue 9 Annex B.10	ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a); RSS-210 Issue 9 Annex B.10(a)	Pass
Restricted Band Around Fundamental Frequency	47 CFR Part 15, Subpart C 15.249; RSS-210 Issue 9 Annex B.10	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209; RSS-210 Issue 9 Annex B.10(b)	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.249, RSS-210 Issue 9 Annex B.10	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d), RSS-210 Issue 9 Annex B.10(b)	Pass
99% Bandwidth	RSS-210 Issue 9 Annex B.10	RSS-Gen Section 6.6	RSS-Gen Section 6.6	Pass

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	AC 120V, 60Hz
Test voltage:	AC 120V, 60Hz
Cable:	AC cable : 120cm
Operation Frequency:	2414.5MHz-2449.5MHz
Modulation Technique:	MSK
Number of Channel:	8
Antenna Type:	PCB
Antenna Gain:	-4dBi

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Test Environment

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2414.5MHz	3	2424.5MHz	5	2434.5MHz	7	2444.5MHz
2	2419.5MHz	4	2429.5MHz	6	2439.5MHz	8	2449.5MHz

EUT has been set to work in continuously transmitting mode. And select test channel as below:

Channel	Frequency
The lowest channel (CH1)	2414.5MHz
The middle channel (CH5)	2434.5MHz
The highest channel (CH8)	2449.5MHz

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25 x 10-8
2	Timeout	2s
3	Duty cycle	0.37%
4	Occupied Bandwidth	3%
5	RF conducted power	0.75dB
6	RF power density	2.84dB
7	Conducted Spurious emissions	0.75dB
8	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
9	Radiated Spurious emission test	4.2dB (Below 30MHz)
		4.4dB (30MHz-1GHz)
		4.6dB (1GHz-18GHz)
10	Temperature test	1°C
11	Humidity test	3%
12	Supply voltages	1.5%
13	Time	3%

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Conducted Emission at AC Power Line					
EMI test receiver	R&S	ESR7	SHEM162-1	2017-11-20	2018-11-19
LISN	Schwarzbeck	NSLK8127	SHEM061-1	2017-11-20	2018-11-19
LISN	EMCO	3816/2	SHEM019-1	2017-11-20	2018-11-19
Pulse limiter	R&S	ESH3-Z2	SHEM029-1	2017-11-20	2018-11-19
CE test Cable	/	CE01	/	2017-11-20	2018-11-19
Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2017-11-20	2018-11-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2017-09-26	2018-09-25
Power meter	R&S	NRP	SHEM057-1	2017-11-20	2018-11-19
Power Sensor	R&S	NRP-Z22	SHEM136-1	2017-07-22	2018-07-21
Power Sensor	R&S	NRP-Z91	SHEM057-2	2017-11-20	2018-11-19
Signal Generator	R&S	SMR40	SHEM058-1	2017-07-03	2018-07-02
Signal Generator	Agilent	N5182A	SHEM182-1	2017-09-26	2018-09-25
Communication Tester	R&S	CMW270	SHEM183-1	2017-10-22	2018-10-21
Switcher	Tonscend	JS0806	SHEM184-1	2017-09-26	2018-09-25
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2017-09-26	2018-09-25
AC Power Stabilizer	WOCEN	6100	SHEM045-1	2017-11-20	2018-11-19
DC Power Supply	QJE	QJ30003SII	SHEM046-1	2017-11-20	2018-11-19
Conducted test Cable	/	RF01, RF 02	/	2017-11-20	2018-11-19
Radiated Test					
EMI test receiver	R&S	ESU40	SHEM051-1	2017-11-20	2018-11-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2017-11-20	2018-11-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2017-04-10	2020-04-09
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2017-02-28	2020-02-27
Antenna (25MHz-3GHz)	Schwarzbeck	HL562	SHEM010-1	2017-02-28	2020-02-27
Horn Antenna (1-8GHz)	Schwarzbeck	HF906	SHEM009-1	2017-10-24	2020-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2017-01-14	2020-01-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2017-12-03	2020-12-02
Pre-amplifier (9KHz-2GHz)	CLAVIIO	BDLNA-0001-412010	SHEM164-1	2017-08-22	2018-08-21
Pre-amplifier (1-18GHz)	CLAVIIO	BDLNA-0118-352810	SHEM050-2	2017-08-22	2018-08-21
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2017-11-20	2018-11-19
Band filter	LORCH	9BRX-875/X150-SR	SHEM156-1	/	/
Band filter	LORCH	13BRX-1950/X500-SR	SHEM083-2	/	/
Band filter	LORCH	5BRX-2400/X200-SR	SHEM155-1	/	/
Band filter	LORCH	5BRX-5500/X1000-SR	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G-100SS	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700-3SS	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2017-07-22	2020-07-21
RE test Cable	/	RE01, RE02, RE06	/	2017-11-20	2018-11-19

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203; RSS-Gen Issue 4 Section 8.3

Limit:

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

6.1.2 Conclusion

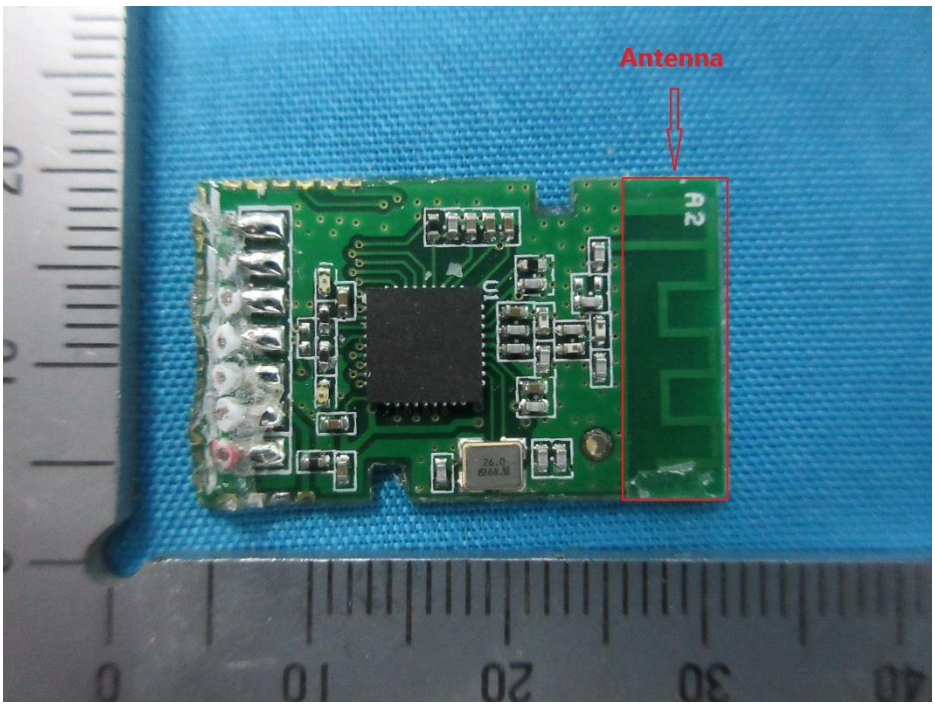
Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently

attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is PCB and integrated on the wireless module and no consideration of replacement. The best case gain of the antenna is -4dBi.



7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207; RSS-Gen Issue4 Section 8.8

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: Engineering Mode: Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type

7.1.2 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

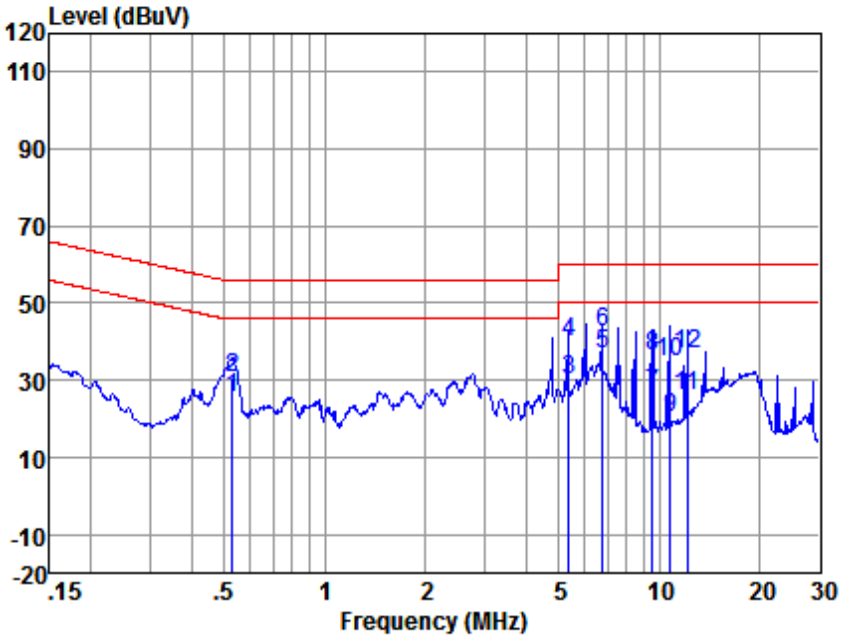
3) The EUT was placed upon a non-metallic table 12mm above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

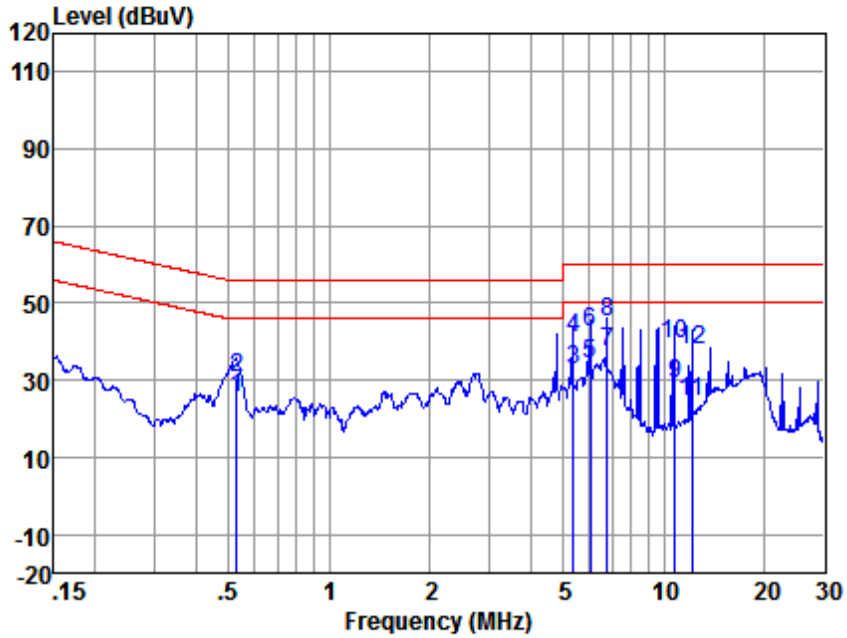
Mode:a; Line:Live Line



Site : chamber
Condition : LISN-L-2017
EUT/Project No: 7979CR
Test mode : a

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.529	15.66	0.11	9.82	25.59	46.00	-20.41	Average
2	0.529	20.62	0.11	9.82	30.55	56.00	-25.45	QP
3	5.362	19.99	0.11	9.86	29.96	50.00	-20.04	Average
4	5.362	29.89	0.11	9.86	39.86	60.00	-20.14	QP
5	6.769	26.63	0.11	9.86	36.60	50.00	-13.40	Average
6	6.769	32.39	0.11	9.86	42.36	60.00	-17.64	QP
7	9.552	16.45	0.10	9.87	26.42	50.00	-23.58	Average
8	9.552	26.27	0.10	9.87	36.24	60.00	-23.76	QP
9	10.790	10.24	0.11	9.88	20.23	50.00	-29.77	Average
10	10.790	25.02	0.11	9.88	35.01	60.00	-24.99	QP
11	12.124	15.92	0.12	9.90	25.94	50.00	-24.06	Average
12	12.124	27.00	0.12	9.90	37.02	60.00	-22.98	QP

Mode:a; Line:Neutral Line



Site : chamber
Condition : LISN-N-2017
EUT/Project No: 7979CR
Test mode : a

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.529	15.78	0.11	9.82	25.71	46.00	-20.29	Average
2	0.529	20.59	0.11	9.82	30.52	56.00	-25.48	QP
3	5.362	22.81	0.13	9.86	32.80	50.00	-17.20	Average
4	5.362	31.05	0.13	9.86	41.04	60.00	-18.96	QP
5	6.024	24.49	0.13	9.86	34.48	50.00	-15.52	Average
6	6.024	32.30	0.13	9.86	42.29	60.00	-17.71	QP
7	6.769	27.42	0.13	9.86	37.41	50.00	-12.59	Average
8	6.769	35.35	0.13	9.86	45.34	60.00	-14.66	QP
9	10.790	19.26	0.14	9.88	29.28	50.00	-20.72	Average
10	10.790	29.57	0.14	9.88	39.59	60.00	-20.41	QP
11	12.124	14.60	0.15	9.90	24.65	50.00	-25.35	Average
12	12.124	27.82	0.15	9.90	37.87	60.00	-22.13	QP

7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
Test Method: ANSI C63.10 (2013) Section 6.9
Limit: N/A

7.2.1 E.U.T. Operation

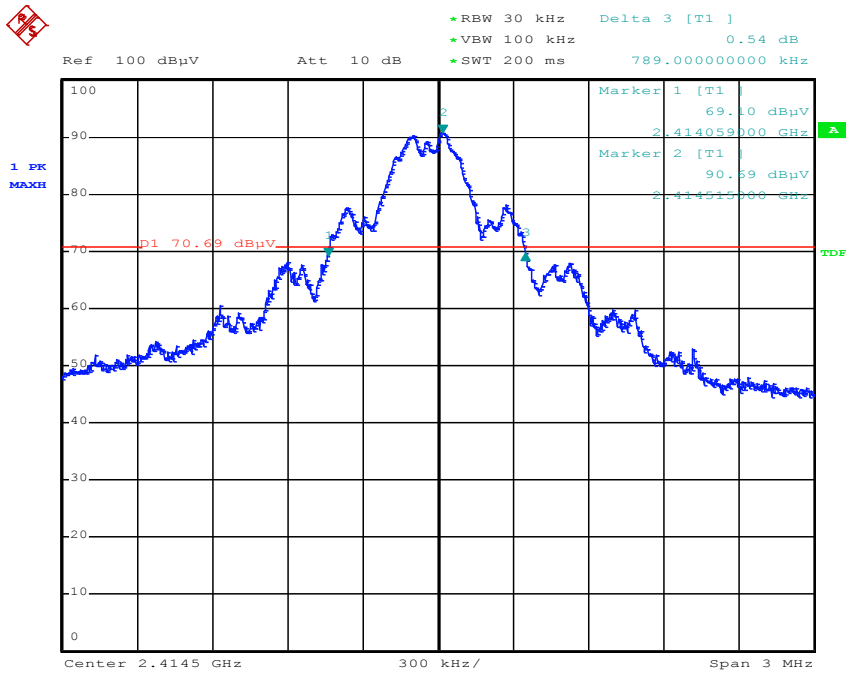
Operating Environment:
Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar
Test mode a: Engineering Mode: Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type

7.2.2 Measurement Procedure and Data

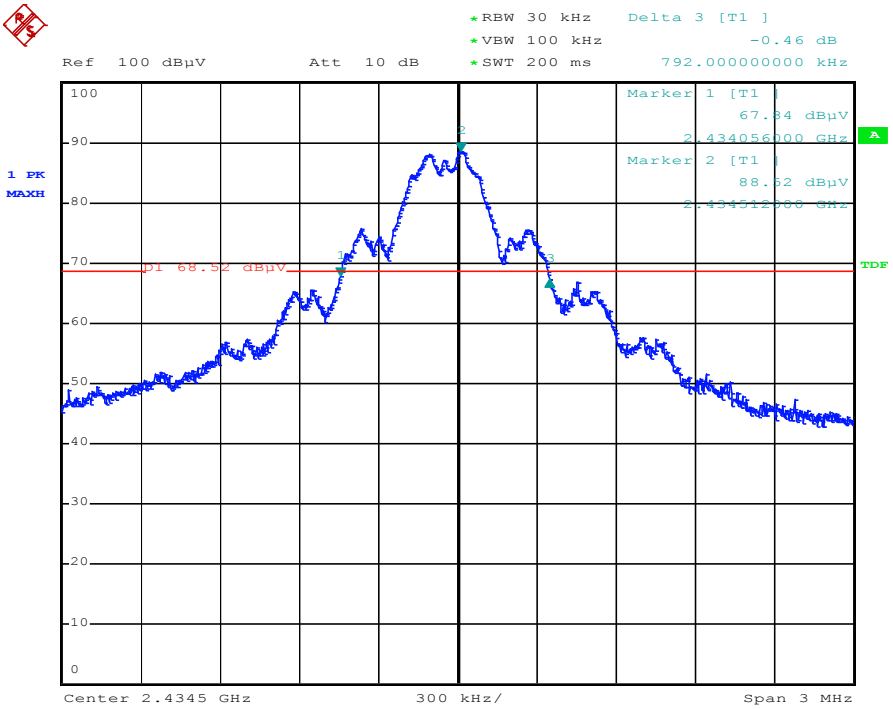
CH	Frequency (MHz)	Bandwidth (kHz)	Result
Low	2414.5	789	PASS
Mid	2434.5	792	PASS
High	2449.5	789	PASS

Test plot as follows:

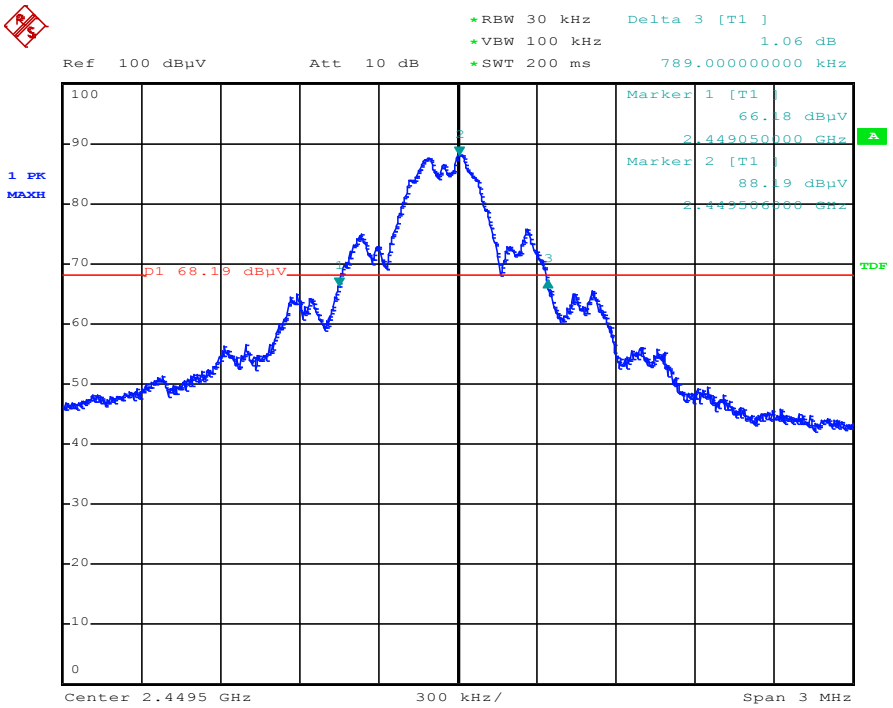
Channel: Lowest



Channel: Middle



Channel: Highest



7.3 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)
RSS-210 Issue 9 Annex B.10(a)
Test Method: ANSI C63.10 (2013) Section 6.5&6.6
Measurement Distance: 3m
Limit:

Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode a: Engineering Mode: Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type

7.3.2 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 12mm above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Corrected Factor

Mode:a; Channel:Low

Mark	Frequency (MHz)	Reading (dBuV)	Corrected factor(dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2414.5	96.04	-3.93	92.11	94	-1.89	Peak	Horizontal
2	2414.5	90.24	-3.93	86.31	94	-7.69	Peak	Vertical

Mode:a; Channel:middle

Mark	Frequency (MHz)	Reading (dBuV)	Corrected factor(dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2434.5	94.49	-3.96	90.53	94	-3.47	Peak	Horizontal
2	2434.5	91.65	-3.96	87.69	94	-6.31	Peak	Vertical

Mode:a; Channel:High

Mark	Frequency (MHz)	Reading (dBuV)	Corrected factor(dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2449.5	95.19	-3.97	91.22	94	-2.78	Peak	Horizontal
2	2449.5	92.02	-3.97	88.05	94	-5.95	Peak	Vertical

Note: If the test value used peak detector is less than average limit, it is deemed compliance with the standards requirement

7.4 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209
RSS-210 Issue 9 Annex B.10(b)

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Measurement Distance: 3m

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value
Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209,whichever is the lesser attenuation.		

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode a: Engineering Mode: Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type

7.4.2 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 12mm above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

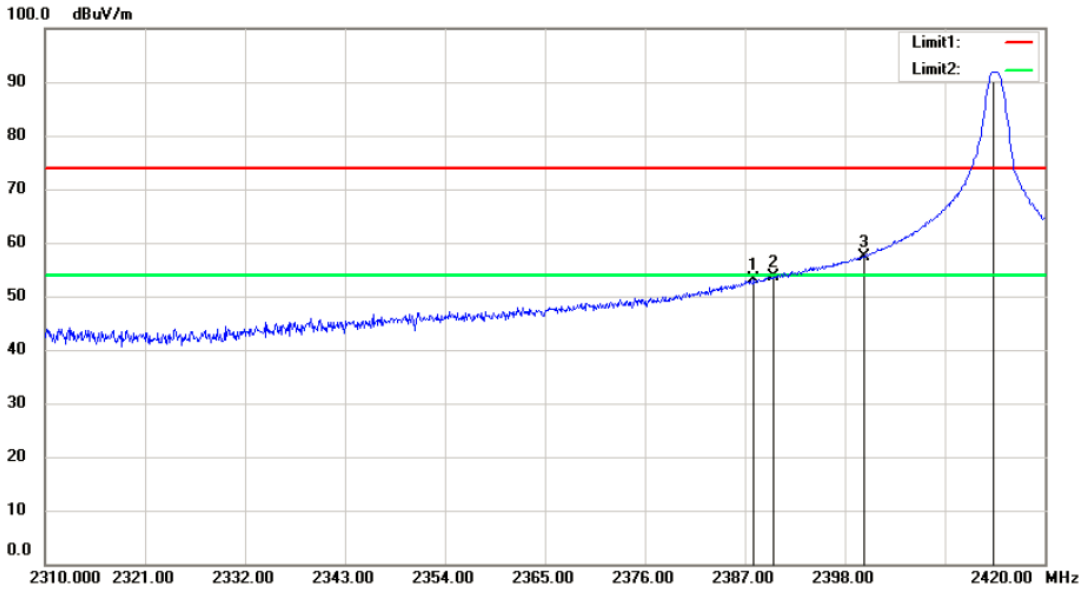
j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Corrected Factor

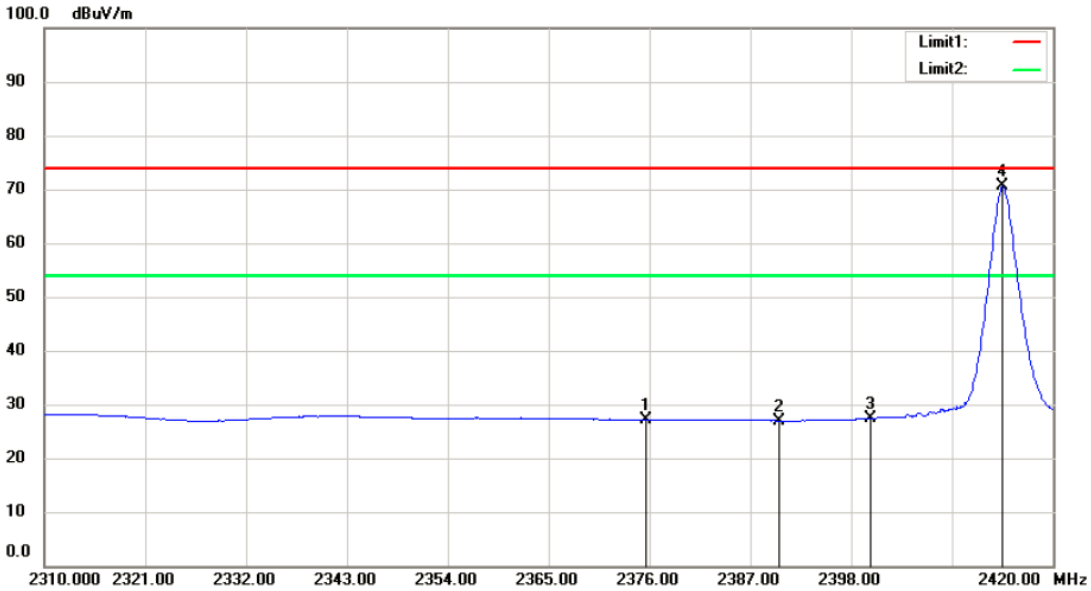
Channel: lowest

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2387.99	56.96	-3.88	53.08	74	-20.92	Peak	Horizontal
2	2390	57.58	-3.89	53.69	74	-20.31	Peak	Horizontal
3	2400	61.39	-3.92	57.47	74	-16.53	Peak	Horizontal
4	2414.28	95.8	-3.93	91.87	74	17.87	Peak	Horizontal
1	2375.67	31.05	-3.84	27.21	54	-26.79	Average	Horizontal
2	2390	30.85	-3.89	26.96	54	-27.04	Average	Horizontal
3	2400	31.25	-3.92	27.33	54	-26.67	Average	Horizontal
4	2414.5	74.57	-3.94	70.63	54	16.63	Average	Horizontal

Peak:



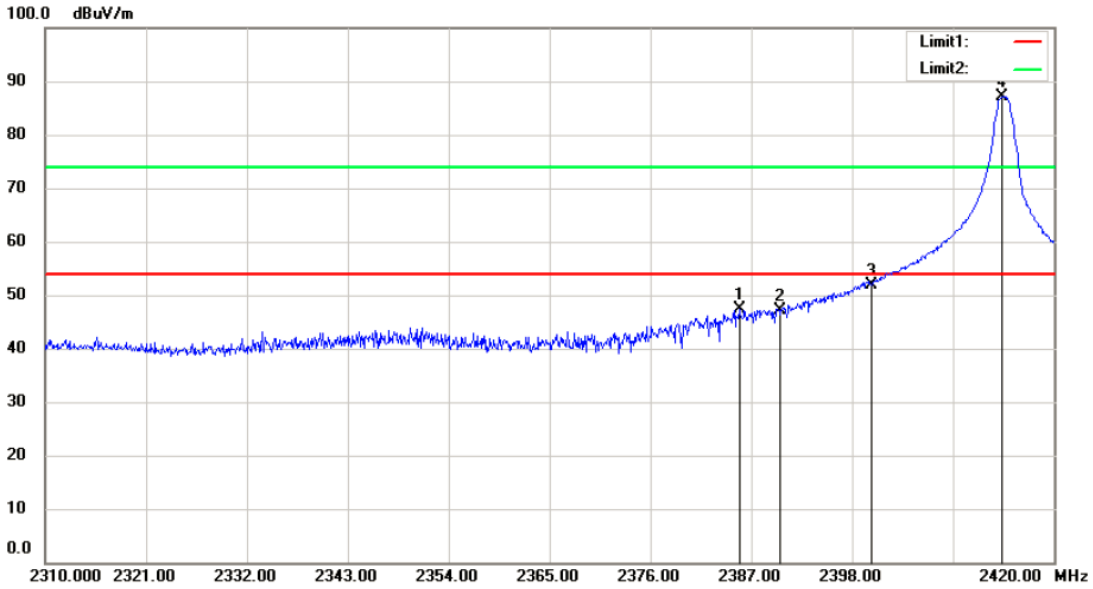
Average:



Channel: lowest

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2385.68	51.14	-3.88	47.26	54	-6.74	Peak	Vertical
2	2390	51.04	-3.89	47.15	54	-6.85	Peak	Vertical
3	2400	55.72	-3.92	51.8	54	-2.2	Peak	Vertical
4	2414.39	91.01	-3.94	87.07	54	33.07	Peak	Vertical

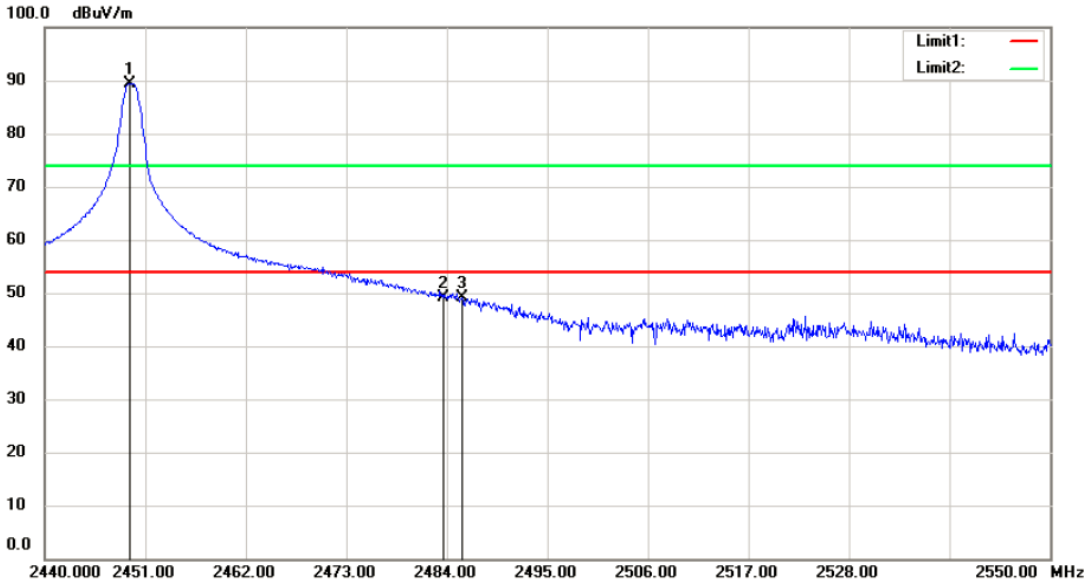
Vertical:



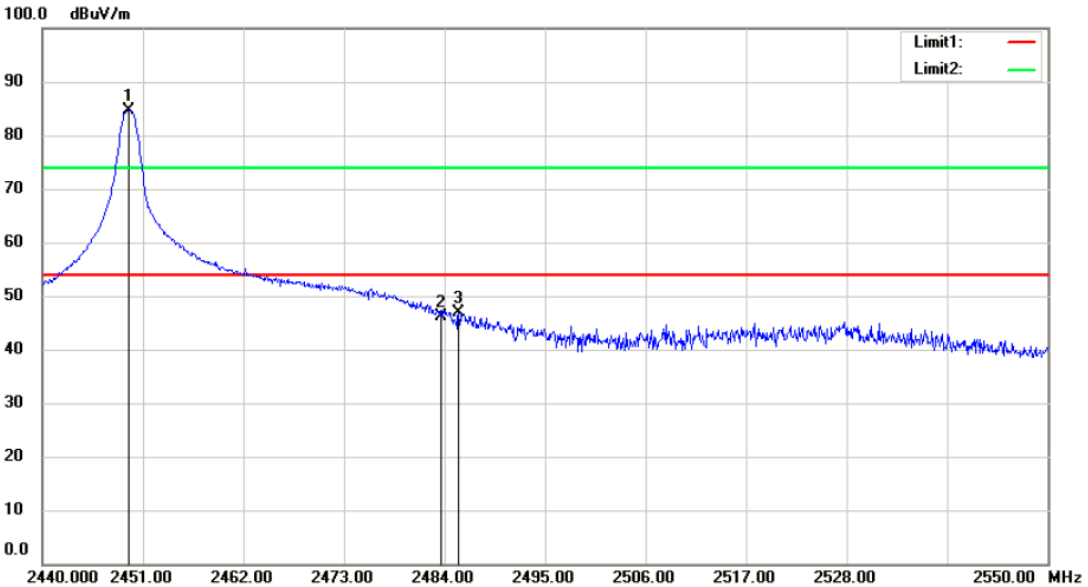
Channel: Highest

MK.	Frequency (MHz)	Reading (dBuV/m)	Corrected factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	2449.35	93.41	-3.97	89.44	54	35.44	Peak	Horizontal
2	2483.5	53.09	-4.01	49.08	54	-4.92	Peak	Horizontal
3	2485.65	53.11	-4.01	49.1	54	-4.9	Peak	Horizontal
1	2449.46	88.59	-3.97	84.62	54	30.62	Peak	Vertical
2	2483.5	50.18	-4.01	46.17	54	-7.83	Peak	Vertical
3	2485.54	50.83	-4.01	46.82	54	-7.18	Peak	Vertical

Horizontal:



Vertical:



7.5 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)
RSS-210 Issue 9 Annex B.10(b)
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Measurement Distance: 3m
Frequency Range: 9KHz to 25GHz
Limit:

Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	QP	300
0.490-1.705	24000/F(kHz)	-	QP	30
1.705-30	30	-	QP	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

7.5.1 E.U.T. Operation

Operating Environment:
Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar
Test mode a: Engineering Mode: Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type

7.5.2 Measurement Procedure and Data

Test Configuration:

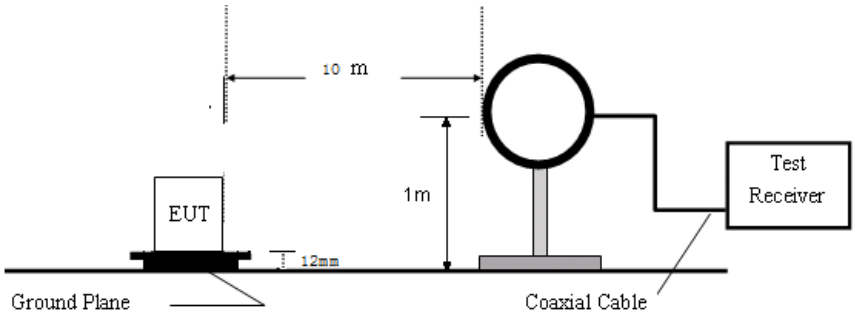


Figure1. Below 30MHz radiated emissions test configuration

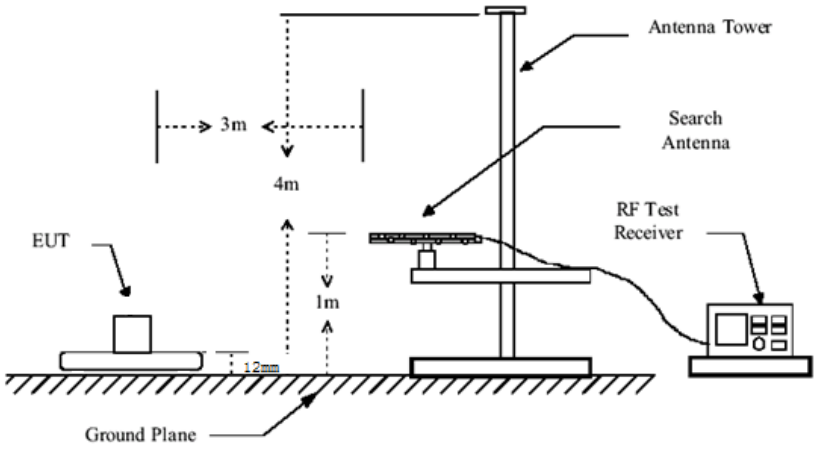


Figure2. 30MHz to 1GHz radiated emissions test configuration

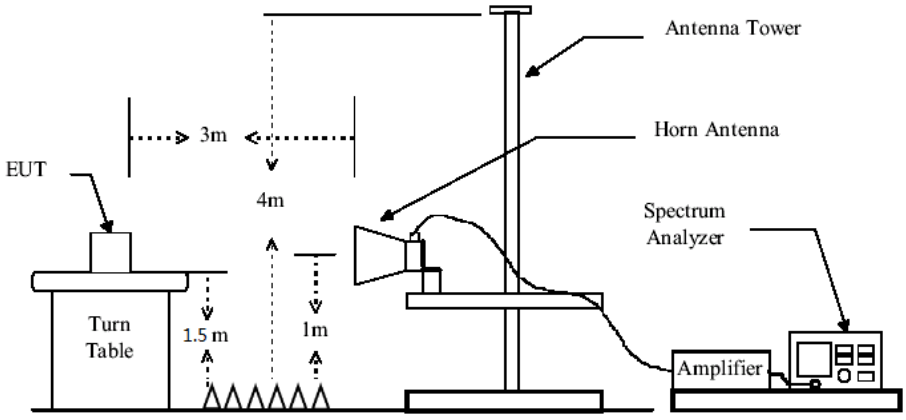


Figure3. Above 1GHz radiated emissions test configuration

Test Procedure: a. For below 1GHz, the EUT was placed on the top of a rotating table 12mm

above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

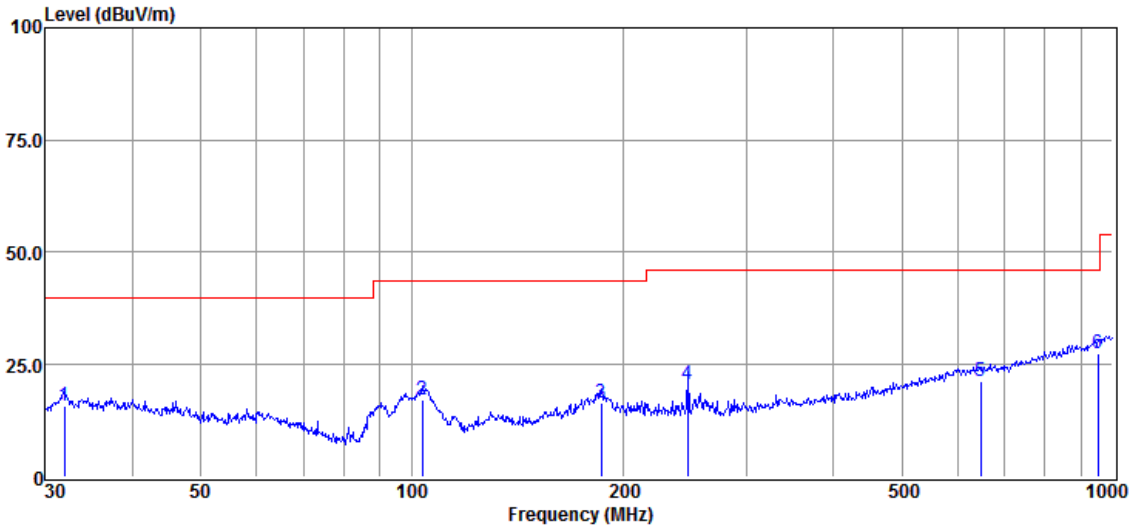
j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Test Result: Pass

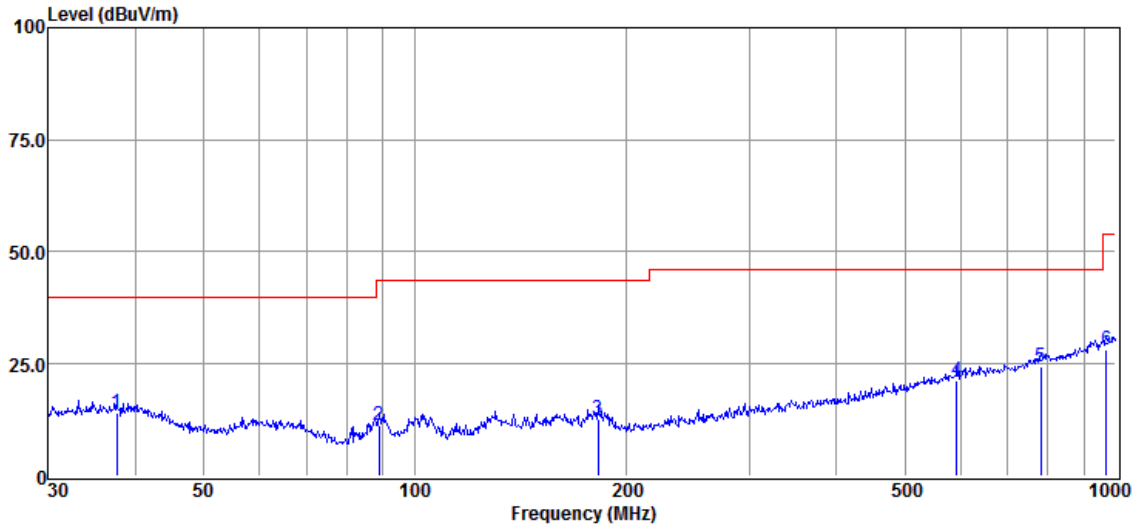
30MHz-1GHz:

Vertical:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	31.96	42.87	15.52	42.61	0.19	15.97	40.00	-24.03	QP
2	103.44	49.87	9.54	42.69	0.47	17.19	43.50	-26.31	QP
3	186.44	47.51	10.83	42.55	0.67	16.46	43.50	-27.04	QP
4	247.68	50.82	11.40	42.46	0.77	20.53	46.00	-25.47	QP
5	647.39	42.36	19.80	42.23	1.51	21.44	46.00	-24.56	QP
6	952.09	43.17	23.29	41.50	2.63	27.59	46.00	-18.41	QP

Horizontal:



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	37.55	40.45	16.08	42.62	0.21	14.12	40.00	-25.88	QP
2	88.96	45.43	8.09	42.68	0.41	11.25	43.50	-32.25	QP
3	182.56	43.10	11.47	42.55	0.67	12.69	43.50	-30.81	QP
4	593.05	43.01	19.27	42.18	1.36	21.46	46.00	-24.54	QP
5	782.35	43.27	21.63	42.50	2.01	24.41	46.00	-21.59	QP
6	968.93	43.43	23.47	41.40	2.69	28.19	54.00	-25.81	QP

Above 1GHz:

Channel: lowest

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4829	39.81	6.45	46.26	54	-7.74	peak	Horizontal
2	7243.5	39.6	10.79	50.39	54	-3.61	peak	Horizontal
3	9658	35.96	14.35	50.31	54	-3.69	peak	Horizontal
4	4829	40.94	6.45	47.39	54	-6.61	peak	Vertical
5	7243.5	40.47	10.79	51.26	54	-2.74	peak	Vertical
6	9658	36.10	14.35	50.45	54	-3.55	peak	Vertical

Channel: Middle

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4869	40.53	6.86	47.39	54	-6.61	peak	Horizontal
2	7303.5	39.18	11.06	50.24	54	-3.76	peak	Horizontal
3	9738	36.57	14.36	50.93	54	-3.07	peak	Horizontal
4	4869	42.94	6.86	49.80	54	-4.20	peak	Vertical
5	7303.5	36.68	11.06	47.74	54	-6.26	peak	Vertical
6	9738	31.93	14.36	46.29	54	-7.71	peak	Vertical

Channel: Highest

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	4899	38.17	7.19	45.36	54	-8.64	peak	Horizontal
2	7348.5	36.48	11.25	47.73	54	-6.27	peak	Horizontal
3	9798	35.44	14.37	49.81	54	-4.19	peak	Horizontal
4	4899	39.17	7.19	46.36	54	-7.64	peak	Vertical
5	7348.5	35.75	11.25	47.00	54	-7.00	peak	Vertical
6	9798	33.57	14.37	47.94	54	-6.06	peak	Vertical

7.6 99% Bandwidth

Test Requirement RSS-Gen Issue 4 Section 6.6
Test Method: RSS-Gen Issue 4 Section 6.6
Limit: N/A

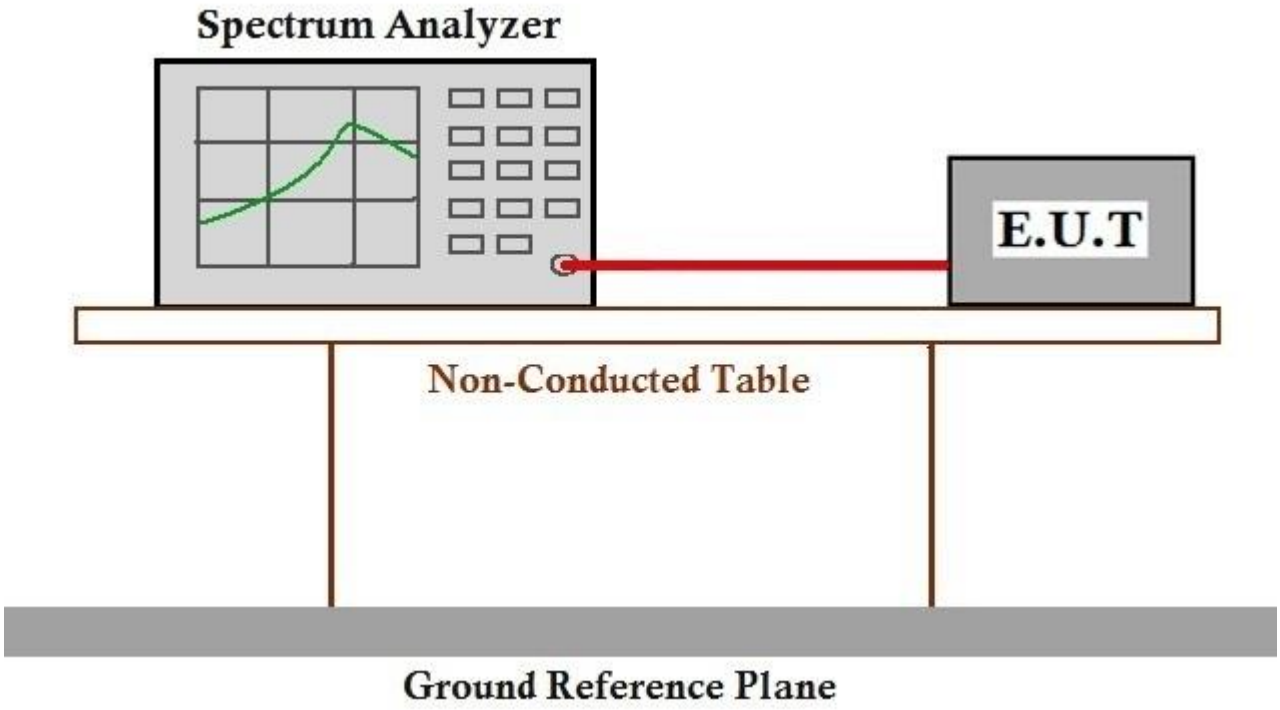
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 45 % RH Atmospheric Pressure: 1010 mbar

Test mode a: Engineering Mode: Using test software to control EUT working in continuous transmitting and receiving, and select channel and modulation type

7.6.2 Test Setup Diagram

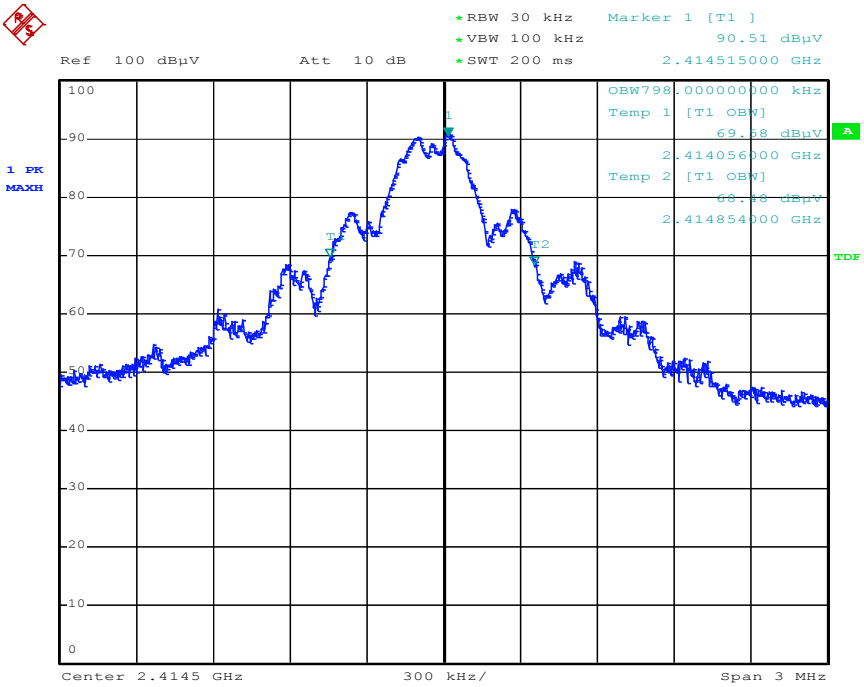


7.6.3 Measurement Procedure and Data

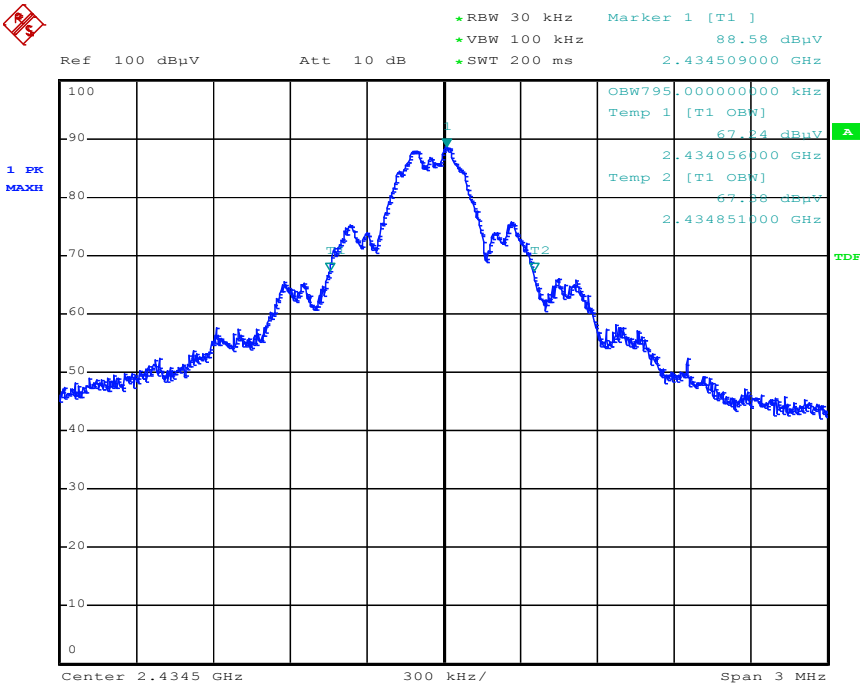
CH	Frequency (MHz)	Bandwidth (MHz)
Low	2414.5	0.798
Mid	2434.5	0.795
High	2449.5	0.762

Test plot as follows:

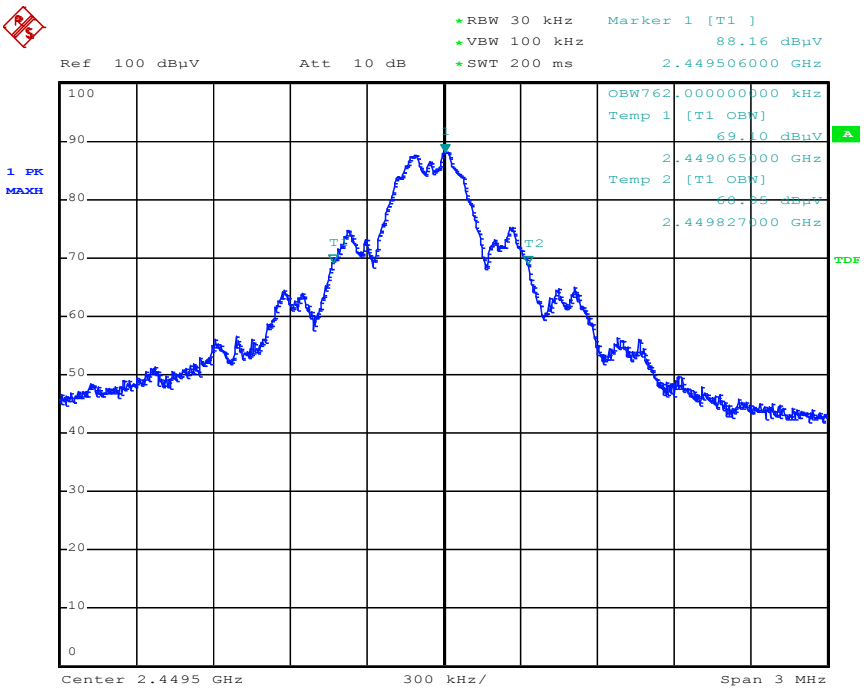
Channel: Lowest



Channel: Middle



Channel: Highest



8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < External Photos > & <Internal Photos>.

- End of the Report -